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SURFACE-TO-AIR MISSILE SITES IN THE URAL MOUNTAINS AREA

PIC/JR-21/59

AUGUST 1959

PIC/JR-21/59

PREFACE

This Joint Photographic Intelligence Report prepared by the Army, Navy, and Central Intelligence Agency provides a preliminary photo analysis of 19 surface-to-air missile sites in the Ural Mountains area, USSR.

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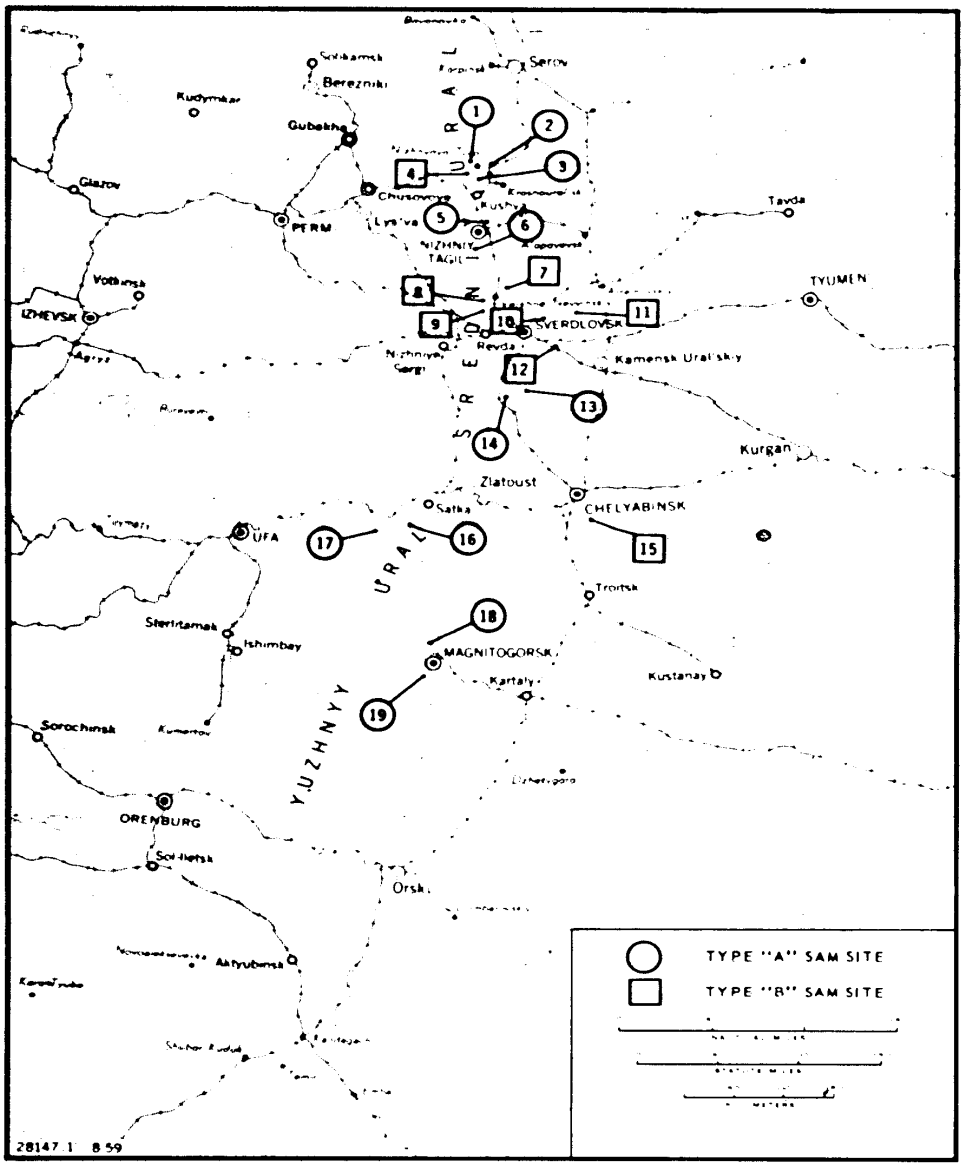


FIGURE 1. LOCATION MAP. This map depicts SAM sites in the Ural Mountains area, USSR.

1. INTRODUCTION

25X9 Nineteen surface-to-air missile (SAM) sites have been identified near [redacted] and industrial complexes in the Ural Mountains area, USSR (Figure 1). These sites, appearing on aerial photography [redacted] are in varying stages of construction and are different in design and operation from the SAM sites ringing Moscow.

Two types of sites are presently being built in the Ural Mountains area. These two types, for the purpose of this report, are designated Type "A" and Type "B" (Figure 2). Eleven sites are Type "A" and eight sites are Type "B"."

Both types consist of a fenced operations area and a nearby support area. All sites are served by improved roads No rail facilities have been observed leading to the sites.

A total of twenty missiles, twenty-four missile launchers and three possible guidance radars have been identified. Nine of the missiles are positioned on launchers, and eleven are positioned on trailers.

The existence of missiles on launchers and possible guidance radars at three of the sites suggests an immediate operational capability.

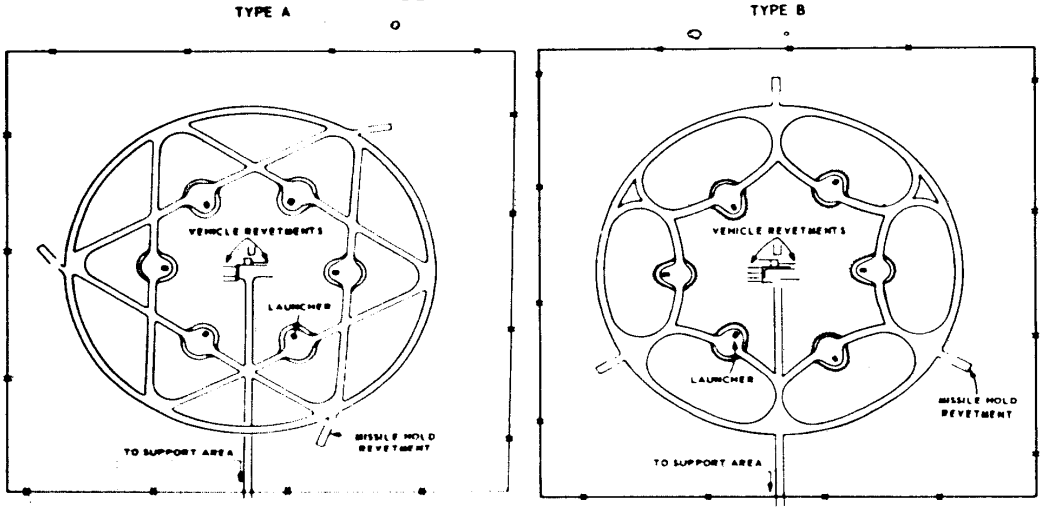


FIGURE 2. LINE DRAWING, COMPARISON OF TYPE "A" AND TYPE "B" OPERATIONAL AREAS.

II. CONCLUSIONS

The following conclusions are based on a preliminary photographic analysis.

1. The SAM sites in the Ural Mountains area are less complex in design and require much less construction material and construction equipment than the SAM sites in the Moscow area.

2. The sites are deployed for point defense.

3. The Type "B" sites are more efficient in missile-reload capability than the Type "A" sites.

4. Total immediate firepower capability is six missiles with an additional six missiles in stand-by status.

5. The sites, although not permanent in construction, are designed for sustained operations.

6. The system employed on these sites is self-sufficient and capable of operating with field forces.

7. Three sites presently appear to have some operational capability.

8. SAM systems similar to those in the Ural Mountains area are probably being employed elsewhere in the USSR and Satellites.

III. GENERAL 25X9

The SAM sites, in the Ural Mountains area, are deployed for point defense of [redacted] key industrial complexes. The average distance from a target complex to a SAM site is 11 nautical miles, and in most cases, at least two SAM sites are deployed at a complex. The average distance between SAM sites deployed at a complex is 23 nautical miles.

Both Type "A" and Type "B" SAM sites have a fenced operations area and a nearby support area (Figures 4 through 7). A missile-guidance system radar is positioned on an earth mound near the center of the operations area. The radar is surrounded by ten associated guidance equipment vehicles within revetments. Cables radiate from the guidance area to six drive-through launch revetments positioned in a hexagonal pattern. Each

completed launch revetment contains a gravel-surfaced pad to support the launcher. A gravel-surfaced circular service road encompasses the launch revetments. Other gravel-surfaced service roads lead from the circular road through the launch revetments. These service roads in the Type "A" site form a six-pointed star pattern and in the Type "B" site form six separate elliptical patterns. Three missile-hold revetments which can accommodate two missiles each, are equally spaced around the exterior side of the circular road. Missile tractor-trailers (transporters), launcher prime movers, and other vehicles and equipment are parked in a specially prepared area. On some of the sites the entrance road to the operations area also serves the support area.

The support area contains both permanent and temporary living quarters and minor support facilities. There is no evidence of the construction of assembly, checkout, fueling, or repair facilities.

Type "A" and Type "B" sites differ in the design of the operations area (Figure 2). The primary differences are in the positioning of the launch revetments and in the positioning of the missile-hold revetments in relation to the service roads.

The Type "A" launch revetments have all launchers positioned on the inner side of the service roads. Counterclockwise flow of traffic is indicated by the position of the missile-hold revetments in relation to the service roads. Two launch revetments are serviced from each missile-hold revetment. Type "B" launch revetments have the launchers alternating in position from the inner to the outer side of the service roads. A clockwise and counterclockwise flow of traffic is indicated by the position of the missile-hold revetments in relation to the service roads. Two launch revetments are serviced from each missile-hold revetment.

The service-road network at Type "B" sites indicates a more efficient missile-reload capability. Roads leaving the three missile-hold revetments, and crossing the circular service road, branch right and left, permitting two transporters to simultaneously service two launchers. Upon servicing the launchers the transporters can return to the missile-hold revetment by completing an elliptic turn.

At the Type "A" sites, however, for two transporters to simultaneously service two launchers, one of the transporters must proceed along the circular service road and bypass one of the two launchers being serviced. This results in considerably more transporter travel before reaching one of the launchers and could interfere with transporters reloading other launchers.

A SAM firing unit consists of six mobile launchers with six cargo-type prime movers, six missiles on trailers pulled by six ZIS 151 tractors, seven van-type vehicles, three van-type trailers, and one radar trailer. No other vehicles, except a possible 1/4-ton truck, have been observed at the sites.

Each launcher has removable bogie wheels. When the launcher is emplaced the bogie wheels are removed and kept in the motor vehicle park behind their respective prime mover. When emplaced, the launchers appear to have outriggers which probably fold against the longitudinal girder for traveling. The launchers have elevation and traverse capability. It appears that the launcher rail move independently in elevation and depends on the carriage for positioning in azimuth. A blast deflector is attached to the rear of the launcher carriage. When the launcher is emplaced the blast deflector is lowered from its traveling position to ground level and moves with the launcher in azimuth only.

When the launcher has been emplaced, the transporter, with a missile, drives into the revetment and stops on alignment chocks in front of the launcher (Figure 3). The missile is probably turned on the trailer in a clockwise direction and positioned tailfirst onto the launcher. The transporter then returns to the motor park. It appears that no special equipment is required for handling the missiles. At some sites missiles have been observed in the hold revetments on trailers while tractors are in the motor park. At other sites missiles have been left on their trailers in the operational revetments while the tractors are in the motor park.

Each of the "A" type sites in which construction is almost complete has a gravel-surfaced vehicle parking area, a POL storage area and a revetment possibly for servicing of vehicles. The motor park is simple

FIGURE 3. PERSPECTIVE DRAWING OF A LAUNCH EMPLACEMENT. This perspective drawing of a typical SAM launch revetment shows a canvas-covered launcher and a missile being brought into position. It is currently undetermined whether the GUIDELINE missile depicted here actually operates from the type "A" and type "B" SAM sites treated in this report.

in construction and designed to perform only first- and possibly second-echelon maintenance. This is evidenced by the lack of ordnance support equipment.

The missile-guidance system radar equipment is all contained in vans. When the vans arrive on site they are usually emplaced in three double and four single revetments near the center of the operations area. The radar is placed on an earth mound near the vans, the canvas cover removed and the set assembled. Cables are laid from the vans to each launcher.

Operational equipment similar to that found at the Ural Mountains area SAM sites has been observed elsewhere in the USSR and in [redacted] On ground photography dated 3 July 1959, 1/ launchers of the same type were observed being transported on rail flatcars in the Leningrad area. On aerial photography dated [redacted] 2/ canvas-

25X6

25X6

25X6

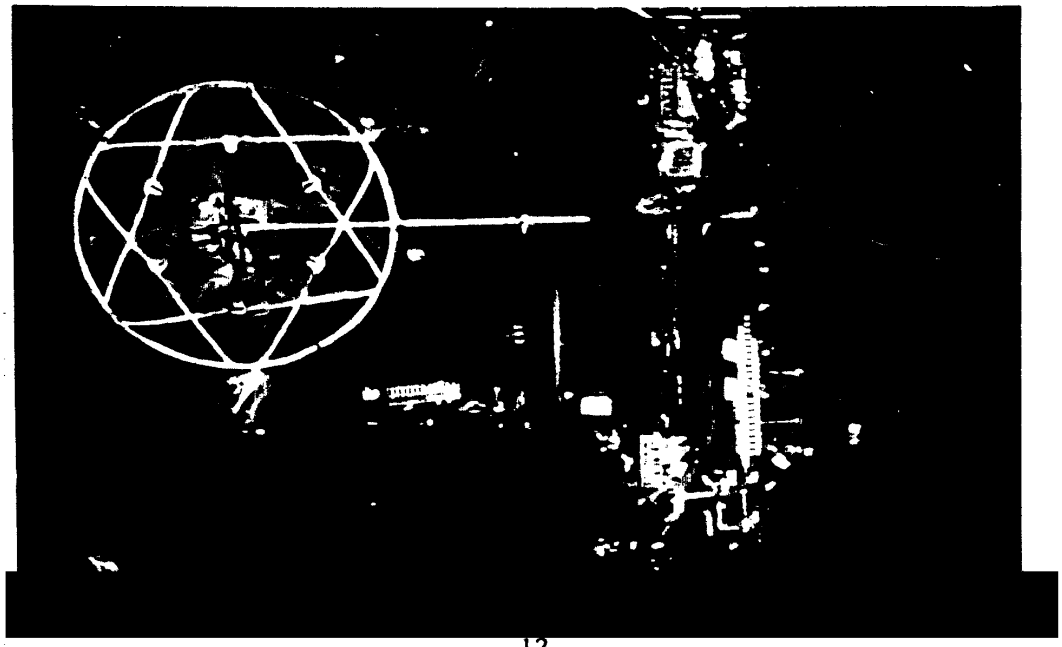
25X1D

covered missiles resembling those found in the Ural Mountains area were observed at the Istra Assembly Plant. [redacted]

The support area is divided into living and maintenance sections. In the living section are the tents, BOQ's, mess hall, administration buildings, and the athletic and drill field. Living accommodations for approximately 125 men are found at the sites most nearly completed. However, personnel at most of the sites are still living in tents. There is a possible vehicle shed under construction in the maintenance section of the two sites in addition to other support-type buildings. None of the support areas appear to be completed.

IV. TYPE "A" SAM SITES

The following tabulation is a description of facilities which may be found at a typical Type "A" SAM site. Item numbers are keyed to Figure 5.



ILLEGIB

Item No.	Description	Dimensions (feet)
1	Missile-guidance system radar positioned on earth mound.	Not available
2	Seven revetments for vehicles associated with the missile-guidance system	
	Three double-bay revetments Four single-bay revetments	Each 30 (wide) [redacted]

25X1D

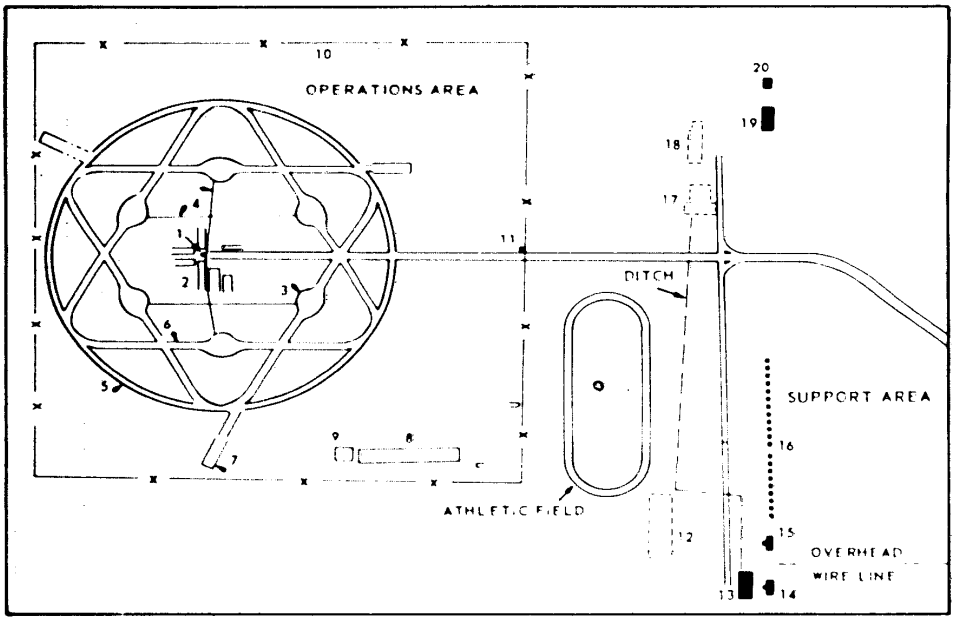


FIGURE 5. LINE DRAWING OF TYPE "A" SAM SITE. The line drawing (not to scale) is of the typical type "A" SAM site shown in Fig. 4. The numbered annotations are fully described in the accompanying text.

25X1D

3	Six launch revetments (Each revetment is elliptical in shape and consists of a gravel-surfaced launch pad and a gravel-surfaced drive-through road) Four wheel chocks positioned on the drive-through road. Each revetment containing a launcher with a blast deflector attached to the rear	[redacted]
4	Cables (possibly in shallow ditches) from guidance area to each launch revetment.	

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Item No.	Description	Dimensions (feet)
5	Circular service road, graveled	920 (outside dia.)
6	Launch revetment service roads, graveled, consisting of six straight line chords inside of the circular service road. (Each chord passes through one launch revetment. The service roads form a six-pointed star with rounded points.)	[redacted]
7	Three missile-hold revetments, each on exterior side of circular service road. (Each revetment is designed to hold two missiles on trailers.)	110 x 20
8	Vehicle parking area (gravel-surfaced, designed to hold 7 missile transporters, 6 launcher prime movers and all launcher bogie wheels)	205 x 50
9	POL storage area (gravel-surfaced; possibly 3 rows of drums.)	60 x 50
10	Operational area security fence, board	1270 x 1270
11	Operational area entrance, check point, gate and guard shack	[redacted]
12	Possible barracks under construction	
13	Support building	
14	Permanent-type housing	
15	Permanent-type housing	
16	Twenty-one pyramidal tents, gravel-surfaced strip in front	
17	Building under construction	80 x 65
18	Building under construction	135 x 45
19	Support Building	50 x 20
20	Support Building	30 x 25

25X1D

25X1D

V. TYPE "B" SAM SITES

The following tabulation is a description of facilities which may be found at a typical Type "B" SAM site. Item numbers are keyed to Figure 7.

ILLEGIB

Item No.	Description	Dimensions (feet)
1	Missile-guidance system radar positioned on earth mound.	Not available
2	Seven revetments for vehicles associated with the missile-guidance system	
	Three double-bay revetments Four single-bay revetments	Each 30 (wide)
3	Six launch revetments. (Each revetment is elliptical in shape and consists of a gravel-surfaced launch pad and a gravel-surfaced drive-through road.)	

[redacted]

25X1D

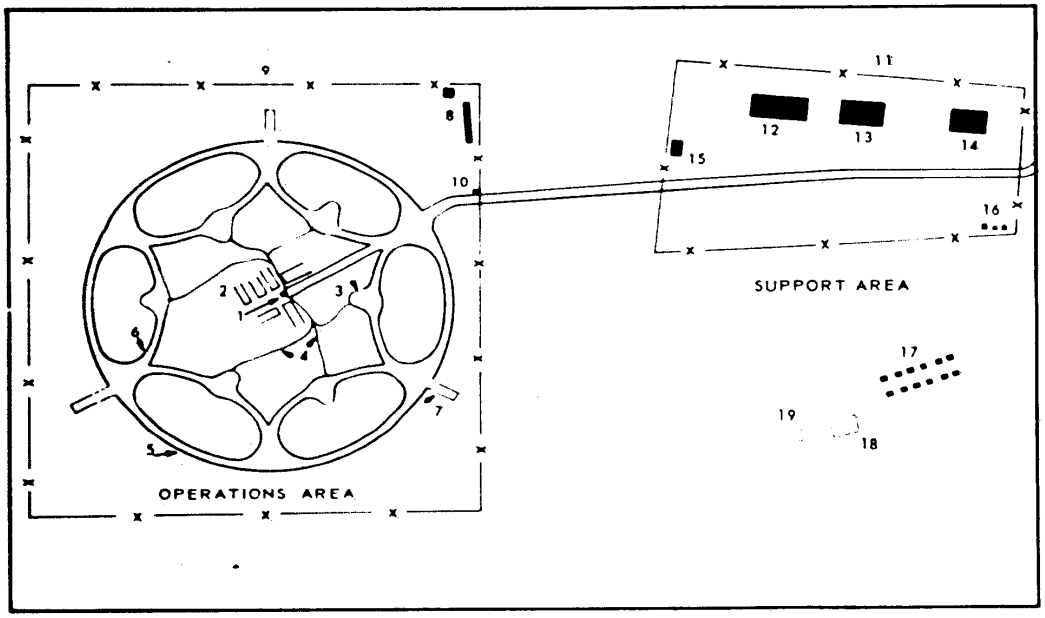
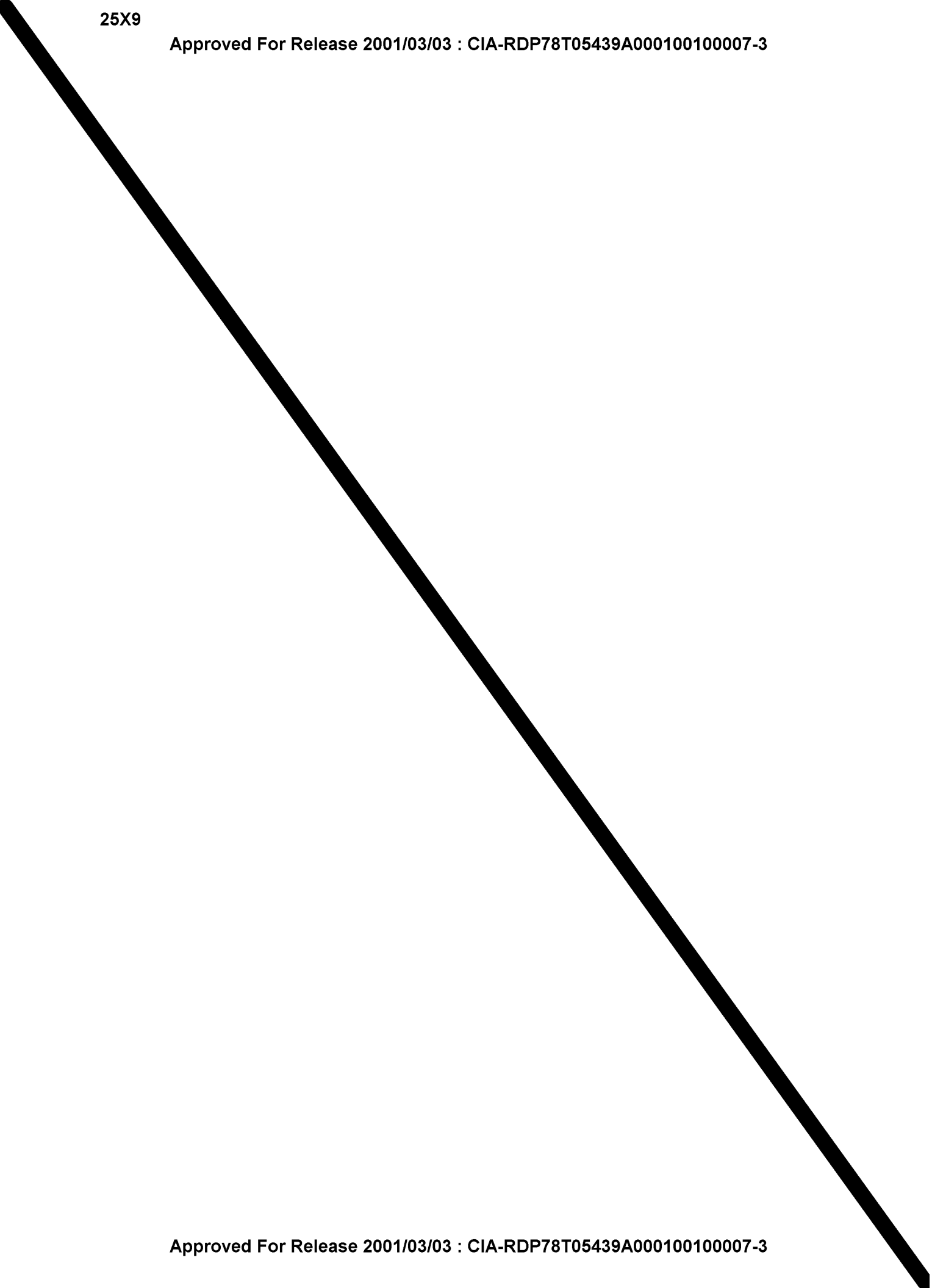


FIGURE 7. LINE DRAWING OF TYPE "B" SAM SITE. The line drawing (not to scale) is of the typical type "B" SAM site shown in Fig. 6. The numbered annotations are fully described in the accompanying text.

Item No.	Description	Dimensions (feet)
	Four wheel chocks positioned on the drive-through road	[redacted]
	Each revetment containing a launcher with a blast deflector attached to the rear	25X1D
4	Cables (possibly in shallow ditches) from guidance system area to each launch revetment	25X1D
5	Circular service road, graveled	920 (outside dia.) [redacted]
6	Launch revetment service roads, graveled, consisting of 6 elliptical-shaped roads.	20 (wide) 10 (width at launch revetment entrances)
7	Three missile-hold revetments, each on exterior side of circular service road. (Each revetment is designed to hold two missiles on trailers.)	25 (wide)

Item No.	Description	Dimensions (feet)
8	Vehicle parking area (gravel-surfaced, designed to hold 7 missile transporters, 6 launcher prime movers, and all launcher bogie wheels)	Not available
9	Operational area security fence, board	Approx. 1255 x 1095
10	Operational area entrance, check point, gate and guard shack	25 (width of gate) [redacted] 25X1D
11	Support area security fence, board	630 x 450
12	Barracks	135 x 40
13	Permanent-type housing	80 x 40
14	Permanent-type housing	70 x 40
15	Support building	35 x 25
16	Three pyramidal tents	[redacted]
17	Twelve pyramidal tents (gravel-surfaced strip in front of tents.)	[redacted] 25X1D
18	Support building under construction	65 x 50
19	Support building under construction	35 x 25



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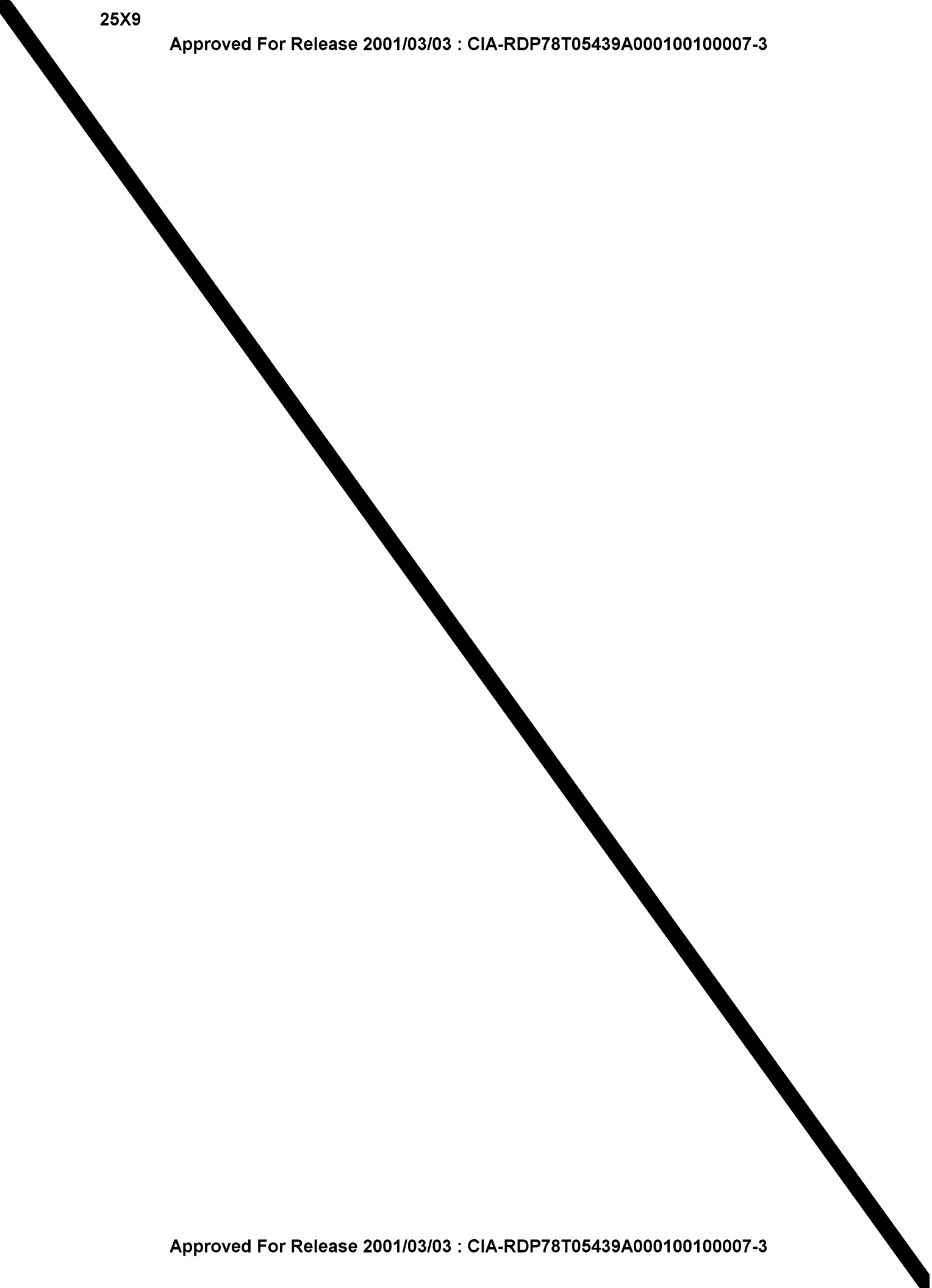
AREA							SUPPORT AREA	
CONSTRUCTION		ITEMS IDENTIFIED					ITEMS IDENTIFIED	
GUIDANCE REVETMENTS	SERVICE ROADS	NO. OF LAUNCHERS	NO. OF MISSILES ON LAUNCHER	NO. OF MISSILES ON TRAILER	GUIDANCE RADAR	NO. OF VEHICLES	NO. OF BLDGS.	NO. OF TENTS
Possibly Complete	Graded	6	Poss. 2	-	Poss.	14	5	-
Possibly Complete	Graded	6	3	2	Poss.	35	2	-
-	-	-	-	-	-	-	2	7
U/C	Unim-proved	-	-	-	-	-	-	6
Early	Graded	-	-	-	-	-	3	6
Early	Unim-proved	-	-	-	-	-	3 U/C	-
Possibly Complete	Graded	6	-	-	-	-	3	-
Late	Graded	None	None	1 3 poss.	-	18	5	16
Early	Early	-	-	-	-	-	4 U/C	5
Mid	Graded	-	-	-	-	-	3 U/C	-
-	Unim-proved	-	-	-	-	-	-	-



Approved For Release 2001/03/03 : CIA-RDP78T05439A000100100007-3

AREA							SUPPORT AREA	
CONSTRUCTION		ITEMS IDENTIFIED					ITEMS IDENTIFIED	
GUIDANCE REVETMENTS	SERVICE ROADS	NO. OF LAUNCHERS	NO. OF MISSILES ON LAUNCHER	NO. OF MISSILES ON TRAILER	GUIDANCE RADAR	NO. OF VEHICLES	NO. OF BLDGS	NO. OF TENTS
Early	Graded	None	None	None	-	-	2	24
Early	Some Graded	None	None	None	-	-	-	5
Not Started	Not Started	-	-	-	-	-	1 U/C	7
Mid	Unim-proved	-	-	-	-	-	6 U/C	20
Probably U/C	Probably Graded	-	-	-	-	-	3	-
Possibly Late	-	-	-	-	-	-	-	-
Late	Graded	1	None	4	-	13	10	14
Complete	Graveled	5	4	1	Prob	12	6 U/C	21

25X1D

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MAP DATA:

WAC 156; 164, 1:1,000,000. (U)

AMS Series N 50 1, 1:250,000. (U)

Sheets

NN 40 - 3; 40 - 6; 40 - 9
NN 41 - 1, 41 - 4
NO 40 - 6; 40 - 9; 40 - 12
NO 41 - 4; 41 - 10

DOCUMENTS:

1/ Army. Moscow #R-220-59, 19 Jun 59 (S) 25X1C

2/ Air. Moscow #1250448, 26 Jun 59. (S) [redacted]
25X1C [redacted]

3/ U.S. Army PIC #SPIR 186, 14 Jul 59. (S) SPECIAL HANDLING REQUIRED
25X1C [redacted]

DESIGNATION OF FISHBONE ANTENNA CONFIGURATIONS

PIC/TP-1/59

JUNE 1959

The purpose of this Technical Publication is to establish a designation system for fishbone antenna configurations, to facilitate reporting and describing similar antennas in future PIC reports. A perspective view of a typical fishbone antenna is shown in Figure 1 and 13 different configurations are diagrammed in Figure 2. Eleven of these configurations have been identified on aerial photography of the Sino-Soviet Bloc. Two configurations (G and H) have not been identified. However, since C and D have been identified, the existence of G and H seems logical.

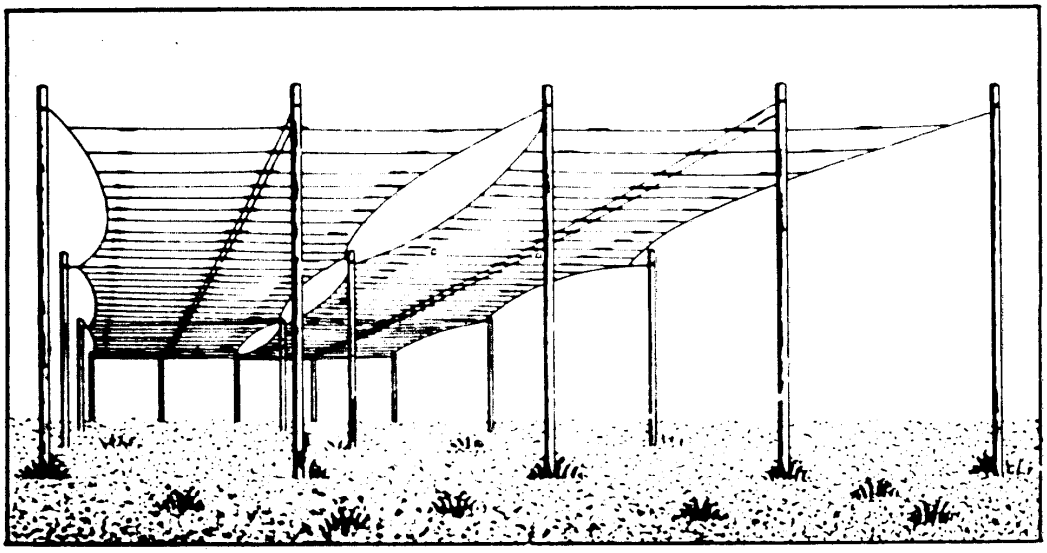

FIGURE 1. TYPICAL FISHBONE ANTENNA—This drawing represents a Type B antenna consisting of two Type A antennas side by side, using joint side poles.

The A configuration and the E configuration are the two basic "building blocks" from which all other known configurations of fishbone antennas are built. For example, two Type A configurations constructed side by side and utilizing common side poles become a type B configuration. A brief physical description of each configuration follows.

Type	Configuration of Poles	
A	3-2-2-3	Single bay - 3 sub-sections long.*
B	5-3-3-5	Double bay - 2 type A configurations side by side using joint side poles.
C	7-4-4-7	Triple bay - 3 type A configurations side by side using joint side poles.
D	9-5-5-9	Quadruple bay - 4 type A configurations side by side using joint side poles.
E	3-2-3	Single bay - 2 sub-sections long.*
F	5-3-5	Double bay - 2 type E configurations side by side using joint side poles.
G	7-4-7	Triple bay - 3 type E configurations side by side using joint side poles.
H	9-5-9	Quadruple bay - 4 type E configurations side by side using joint side poles.
I	5-3-3-5	Two bay for day/night operation - The wide bay used for night reception and the narrow for day reception.
J	7-4-6-3	One type F configuration and one type A configuration side by side using joint side poles. The type A portion is used for night reception; the type F for day reception.
K	5-3-3-5-3-3-5-3-3-5	Three type B configurations end to end utilizing joint end poles.
L	9-5-5-9-5-5-9	Two type B configurations end to end using joint end poles.
M	7-4-4-7	One type B configuration and one type A configuration side by side using joint side poles. The type A portion is used for night reception. The type B portion is used for day reception.

*The term sub-section is used ONLY to clarify the physical description of the two single bay fishbone configurations and does not constitute an electrical subsection since the entire length of the antenna is one electrical section.

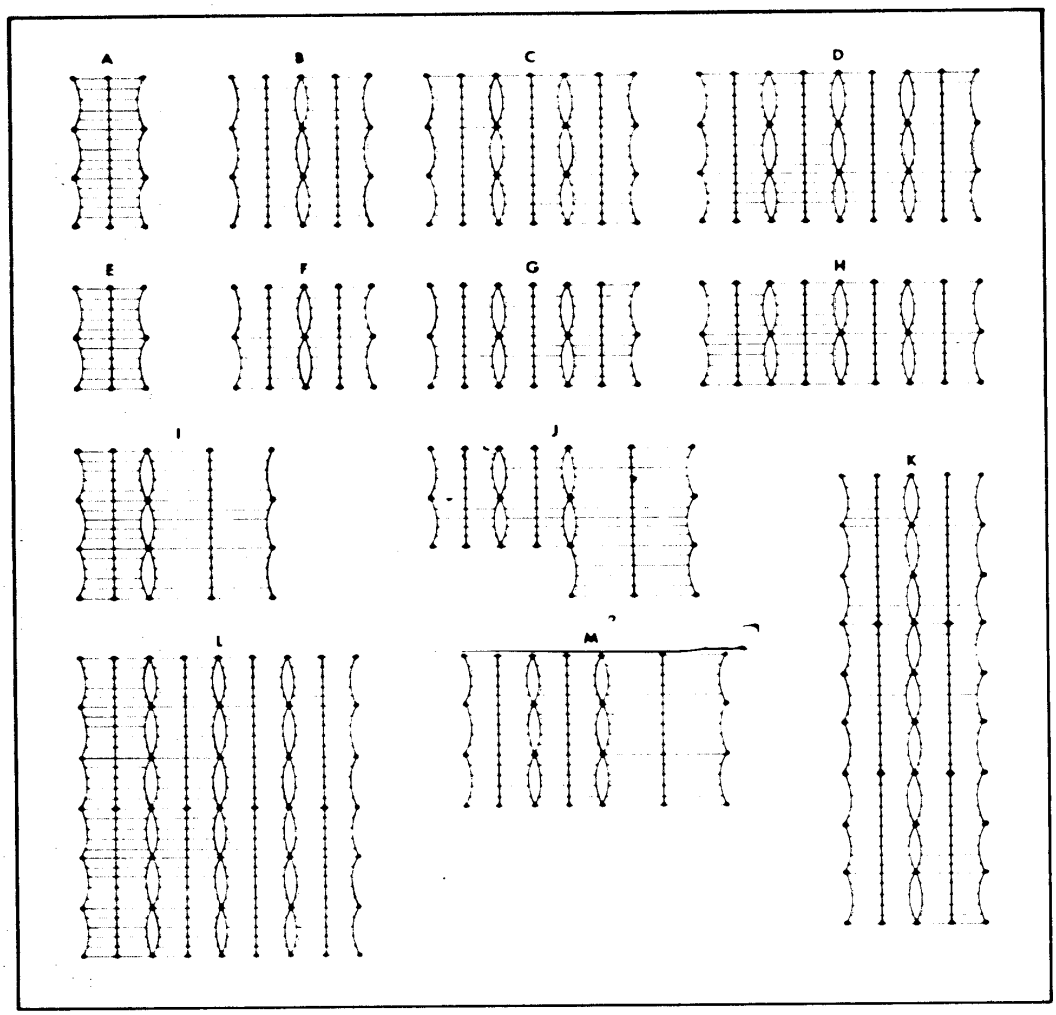

FIGURE 2. THIRTEEN FISHBONE ANTENNA CONFIGURATIONS.